



Second Five-Year Review Report
for
Pine Bend Sanitary Landfill SW-45
Inver Grove Heights, Minnesota

September 2005

PREPARED BY:

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Region 5
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Approved by:

A handwritten signature in dark ink, appearing to read "Richard C. Karl". The signature is written over a horizontal line.

Richard C. Karl, Director
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Date:

9-1-05

Five-Year Review Report

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List of Acronyms

| | |
|-------------------|---|
| ARAR | Applicable or relevant and appropriate requirement |
| CADL | Crosby American Demolition Landfill |
| CERCLA | Comprehensive Environmental Response Compensation Liability Act |
| DCE | Dichloroethane |
| EMS | Environmental Monitoring System |
| EPA | Environmental Protection Agency |
| GCCS | Gas Collection and Control System |
| HDPE | High Density Polyethylene |
| IL | Intervention Limit |
| LCS | Leachate Collection System |
| LFG | Landfill Gas |
| ug/m ³ | Micrograms Per Cubic Meter |
| MERLA | Minnesota Environmental Response and Liability Act |
| mg/kg | Milligram Per Kilogram |
| MNA | Monitored Natural Attenuation |
| MPCA | Minnesota Pollution Control Agency |
| NCP | National Contingency Plan |
| NPL | National Priorities List |
| O&M | Operation and Maintenance |
| PCE | Perchloroethylene |
| PBLI | Pine Bend Landfill Inc. |
| PBSL | Pine Bend Sanitary Landfill |
| ppb | Parts Per Billion |
| ppm | Parts Per Million |
| PRP | Potentially Responsible Party |
| RD/RA | Remedial Design/Remedial Action |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| scfm | Standard Cubic Feet Per Minute |
| SVOC | Semi-Volatile Organic Compound |
| TCE | Trichloroethylene |
| TDS | Total Dissolved Solids |
| TNMOC | Total Non-Methane Organic Carbon |
| VC | Vinyl Chloride |
| VOC | Volatile Organic Chemical |

Executive Summary

The remedy for the Pine Bend Sanitary Landfill Site, located in Inver Grove Heights, Minnesota, is currently protective of human health and the environment due to the connection of residences to the extended municipal water supply system in the affected groundwater area and due to effective actions taken under permits issued through the Minnesota Solid Waste Landfill Compliance Program and under a Response Order issued by MPCA. The long term protectiveness at the site requires: 1) continued compliance with the PBSL solid waste permit, including requirements for monitoring, closure, post-closure, groundwater corrective action and PGSL land use restrictions; and 2) restrictions on potable use of groundwater in the plume area until groundwater standards are achieved. The remedy for the Pine Bend Sanitary Landfill Site requires no additional action under CERCLA or MERLA to ensure protection of human health and the environment because the site is being effectively addressed by the Minnesota Solid Waste Landfill Compliance Program.

In an April 1985 Response Order by Consent signed by the state and Pine Bend Sanitary Landfill (PBSL), the potentially responsible parties (PRPs) were required to investigate the nature and extent of contamination at the site. In September 1992, Amdura Corp. entered into an agreement with the state to temporarily provide bottled water to eight residences and complete an alternate water supply. In fall 1994, the extension of the present municipal water supply system was completed; the residences potentially affected by site contamination were connected to the system; and the contaminated private water supply wells were permanently sealed. In September 1995, the United States Environmental Protection Agency (U.S. EPA) concurred in a "No Further Action" Record of Decision (ROD) based on the following: 1) the permanent connection of residences in the vicinity of the landfill to a municipal water supply thereby reducing the risk posed by contaminated groundwater; 2) the accomplishment of the closure requirements stated in the existing solid waste operating permit (installation of a landfill cover, clay liner; etc.); 3) a new permit would address groundwater contamination; and 4) the site is an active and permitted facility with closure requirements that the facility must meet. A Resource Conservation Recovery Act (RCRA) Subtitle D cap has been placed over all 90 unlined acres of the facility. On September 15, 1997, solid waste permit SW045 was reissued, which contained groundwater monitoring, groundwater corrective action requirements, closure and post closure requirements according to state law. The site was deleted from the National Priorities List on June 23, 1998. A five-year review was completed in September 2000 and found the remedy remains protective of human health and the environment. The trigger action for this five-year review was the signing of the First Five-Year Review Report on September 20, 2000.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Pine Bend Sanitary Landfill Site

EPA ID (from WasteLAN): MND000245795

Region: 5

State: MN

City/County: Inver Grove Heights, Dakota County

SITE STATUS

NPL status: ☐ Final ☒ Deleted ☐ Other (specify) _____

Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete

Multiple OUs? ☒ YES ☐ NO

Construction completion date: 09/25/1995

Has site been put into reuse? ☒ YES ☐ NO

REVIEW STATUS

Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____

Author name: Timothy J. Prendiville

Author title: Remedial Project Manager

Author affiliation: U.S. EPA

Review period: 11/16/04 to 07/29/05

Date(s) of site inspection: 11/16/04

Type of review:

☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead
☐ Regional Discretion

Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify) _____

Triggering action:

☐ Actual RA Onsite Construction at OU # _____

☐ Actual RA Start at OU# _____

☐ Construction Completion

☒ Previous Five-Year Review Report

☐ Other (specify) _____

Triggering action date (from WasteLAN): 9/20/2000

Due date (five years after triggering action date): 09/20/2005

Five-Year Review Summary Form, cont'd.

Issues:

Groundwater wells still exist within groundwater plume area

Recommendations and Follow-up Actions:

An IC Plan should be implemented to either abandon wells in the plume area and/or obtain groundwater use restrictions to ensure wells won't be used for potable purposes in the plume area.

Protectiveness Statement(s):

The remedy at the Pine Bend Sanitary Landfill Site is currently protective of human health and the environment due to the connection of residences to the extended municipal water supply system in the affected groundwater area and due to effective actions taken under permits issued through the Minnesota Solid Waste Landfill Compliance Program and under a Response Order issued by MPCA. The long term protectiveness at the site requires: 1) continued compliance with the PBSL solid waste permit, including monitoring, closure, post-closure, groundwater corrective action requirements and PBSL land use restrictions; and 2) restrictions preventing potable use of groundwater in the groundwater plume area until groundwater standards are achieved.

Other Comments:

None

Five-Year Review Report

I. Introduction

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and recommendations to address them.

The Agency is preparing this five-year review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA) Region 5 has conducted a five-year review of the remedial actions implemented at the Pine Bend Sanitary Landfill Site (the Site), located in Dakota County, Minnesota. This review was conducted by the Remedial Project Manager (RPM) from November 16, 2004 to July 28, 2005. This report documents the results of the review.

This is the second five-year review for the Site. The triggering action for this statutory review is the date of the signature of the first five-year review as shown in EPA's WasteLAN database: September 20, 2000. This review is required because certain response actions are ongoing and hazardous substances, pollutants, or contaminants are or will be left on site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1: Chronology of Site Events

| Event | Date |
|---|---------------------------|
| Crosby American Demolition Landfill (CADL) permit issued | September 15, 1970 |
| Pine Bend Sanitary Landfill (PBSL) issued first permit (SW-045) | September 7, 1971 |
| PBSL proposed for NPL | October 15, 1984 |
| Response Order by Consent Between MPCA and Pine Bend Landfill, Inc. (PBLI) for RI/FS and Response Action | April 1985 |
| Crosby American Properties, Inc. (CAPI) enter Consent order to address groundwater contamination | April 1985 |
| Remedial Investigation performed | 1986 |
| PBSL Site final on NPL | June 10, 1986 |
| Additional Remedial Investigation Activities | 1987 |
| Ground Water Monitoring | 1988-1999 |
| Preliminary Alternatives Report | 1989 |
| Pump Test | 1989-1990 |
| Consent Order Amendment | October 23, 1990 |
| Minnesota Pollution Control Agency (MPCA) Approves RI Report | August 1991 |
| Operable Unit #1 ROD Signed - extension municipal water supply | September 30, 1991 |
| MPCA enters Settlement Agreement for CADL site | September 28, 1992 |

Table 1: Chronology of Site Events

| Event | Date |
|---|---------------------------|
| PBLI and Amdura enter Settlement Agreement on environmental claims | November 11, 1992 |
| MPCA Approves Detailed Analysis Report | November 1994 |
| Municipal water hookups completed | November 1994 |
| Operable Unit #2 and #3 ROD Signed | September 28, 1995 |
| MPCA Terminates Amended Response Order by Consent | November 14, 1996 |
| PBSL permit reissued | September 15, 1997 |
| Site Deleted from NPL | June 23, 1998 |
| First Five Year Review completed by MPCA | September 20, 2000 |
| Major permit modification issued | January 12, 2004 |

III. Background

Physical Characteristics

The Pine Bend Sanitary Landfill (PBSL) site is located in northeast Dakota County, on the periphery of the Minneapolis/St. Paul metropolitan area, in Section 27, 28 and 33, Township 27 North, Range 22 West, City of Inver Grove Heights, Minnesota (see Attachment 1). PBSL encompasses approximately 255 acres and is an open operating mixed municipal solid waste facility. Crosby American Demolition Landfill (CADL) is located immediately north of the PBSL. The PBSL and CADL were operated as separate landfills under separate ownership. CADL encompasses approximately 52 acres and ceased accepting waste in 1989 and is inactive. CADL and PBSL are connected hydrogeologically in the surficial aquifer, with CADL being immediately down and sidegradient of PBSL, and PBSL being sidegradient of CADL. MPCA has considered the two landfills as one site because hydrogeologic data demonstrates that the ground water contamination plumes emanating from each landfill commingle east of their common border.

Land and Resource Use

The PBSL is bordered on the south by industrial areas, to the east by residential and industrial areas, to the north by residential areas, and to the west by pasture and residential areas. The terrain is generally flat to gently rolling and possesses an immature natural surface drainage

system resulting in numerous ponds and wetlands. The Mississippi River is located approximately one mile to the east of the Site. Currently PBSL is an active landfill.

History of Contamination

The PBSL was first issued a permit (SW-045) to operate by the MPCA on September 7, 1971. Since then, it has operated as a sanitary landfill accepting mixed municipal solid waste (mmsw) and nonhazardous industrial waste. Pine Bend Landfill, Inc., (PBLI), a wholly-owned subsidiary of Allied Waste, is the owner and permittee of the PBSL.

The PBSL site occupies 366 acres of which roughly half is areas of mixed municipal solid waste landfill. The filling operations began in 1971 with both non-hazardous industrial waste and mixed municipal solid waste. The rate of disposal changed over the years. For example, the average rate of disposal in 1987 was 60,000 tons per month, whereas in 1994 the rate of disposal was 16,000 tons per month.

In the vicinity of PBSL, the bedrock is overlain by a thick sequence of glacial drift. At the surface the drift consists of sand and gravel outwash deposits. Shallow groundwater in the PBSL area is present in the surficial drift at depths of 90 to 210 feet below ground surface. The ground water flow beneath the site is to the east/northeast and the average linear velocity of the ground water in the glacial drift aquifer is estimated to range from 240 to 1900 feet/year.

Volatile organic compounds (VOCs) were detected in the surficial drift aquifer beneath PBSL in 1982, and newly installed monitoring wells in 1983. VOCs detected included benzene, methylene chloride, chlorinated ethylene, and fluorocarbons. Local residential wells were also screened in this aquifer. Volatile organic compounds were detected in private residential wells east of the site in 1984. Sampling after 1984 showed that a number of residential and production wells to the east of the site were contaminated with one or more VOCs.

An extensive ground water monitoring system is present around the PBSL. A wide range of compounds, both organic and inorganic, have been detected in the groundwater samples from the PBSL area. The highest concentrations of VOCs are found in samples from monitoring wells located in close proximity to the PBSL. Freon compounds are the most prevalent of the VOCs, but chlorinated solvents are also present in substantial concentrations in samples from many of the wells.

Initial Action

U.S. EPA became involved at the Site in 1984 when it conducted a site investigation and developed a score under the Hazard Ranking System. The score qualified the Site for listing on the National Priorities List (NPL). The Site was placed on the NPL on June 10, 1986. Prior to being listed, in April 1985, under the Minnesota Environmental Response and Liability Act (MERLA), Pine Bend Landfill, Inc., entered into a Response Order by Consent with the MPCA to carry out a Remedial Investigation (RI), Feasibility Study (FS), and Response Actions (RA).

The Consent Order was amended on October 23, 1990. Pursuant to the Consent Order, PBLI has, amongst other things, conducted an RI (1986), conducted additional RI activities (1987), conducted a pump test (1989-90), submitted a Preliminary Alternatives Report (1989), undertaken an interim groundwater monitoring program (1988-1994), submitted an MPCA approved final RI report (August 1991), and an MPCA approved Detailed Analysis Report (November 1994). PBSL has completed the operable unit (OU#1) for a permanent alternative water supply and is now addressing source control (OU#2). The following work is required to be completed under the MPCA operating permit:

“Placement of final cover on portions of the landfill that are filled to the final elevations, installation of a combustible gas collection system, installation of a clay liner and leachate collection system in an expansion area, and the installation of a surface drainage control system. The existing groundwater contamination is to be addressed through a compliance permit with Pine Bend Landfill. Browning Ferris Industries, Inc., by signing the Amended Order dated October 23, 1990, guarantees PBLI’s performance of the obligations established in said Amended Order.”

CADL was permitted on September 15, 1970. In April 1985, under MERLA, Crosby American Properties, Inc. (CAPI) entered into a Consent Order to address ground water contamination including volatile organic contaminants (VOC’s). Due to bankruptcy proceedings, CAPI claimed it could not carry out the terms of its Consent Order and suspended all activities at the CADL site. MPCA entered into a settlement agreement for the CADL site on September 28, 1992. In the agreement, Amdura Corporation agreed to implement the preferred remedy for the CADL site, with the exception that MPCA will provide a portion of the materials for the engineered cover. PBLI and Amdura entered into a Settlement Agreement regarding environmental claims (No. 9226) on November 11, 1992.

IV. Remedial Actions

Remedy Selection

The U.S. EPA and MPCA initially agreed to divide the project into three operable units in order to facilitate progress toward remedial action at the site. The three operable units were OU1, OU2 and ground water contamination OU3. US. EPA staff recommended that OU2 and OU3 be combined for administrative and technical reasons. MPCA concurred with this recommendation. Subsequently, source control and ground water contamination operable units were combined into one operable unit, OU2. The OU1 ROD for PBSL was signed on September 30, 1991.

Remedy Implementation

OU1 - Permanent Alternative Water Supply

The work required under the September 30, 1991 OU1 ROD was completed in November 1994. The components of this selected remedy are

- The extension of the existing City of Inver Grove Heights municipal water supply;
- The connection of impacted or potentially impacted premises to the municipal water supply; and,
- The permanent sealing of the private water wells which presently serve the premises that were connected to the municipal water supply.

OU2 - Source Control and Ground Water Contamination

The ROD for OU2 was signed on September 28, 1995 and called for no further action at the facility. The ROD specified that any potential problems associated with the site would be addressed through the Minnesota Solid Waste Landfill Compliance Program, the Resource Conservation and Recovery Act, and a Response Order by Consent between the MPCA and PBLI. This is an open facility. Under these programs and order, the site will be continued to be monitored to verify that no unacceptable risks posed by the Site occur in the future. The landfill is an operating facility and all remedial work was considered to be covered under the operating permit (installation of a landfill cover, clay liner, leachate collection system, etc.). The Site was subsequently deleted from the NPL on June 23, 1998.

Corrective Action of VOCs in groundwater is addressed and implemented under Permit SW-045. The source control provided for the facility is a low permeability cover, combustible gas collection system and surface drainage control system, which reduces both the production of leachate and the toxicity of the compounds released from the closed, unlined fill area.

PBL has conducted numerous response activities under Permit SW-045, including the following:

- 1) Installation of an active landfill gas/methane gas recovery system consisting of the following components:
 - a) Final cover on Phase I and II including:
 - i) high permeability sand layer to promote venting of landfill gas/methane gas;
 - ii) low permeability landfill cap to prevent infiltration of precipitation;
 - iii) rooting zone soils; and
 - iv) top soils.
 - b) Active gas wells connected by lateral lines;

- c) Landfill gas to energy plant;
- 2) Installation of a liner and leachate collection system under all horizontal areas of phased development;
- 3) Implementation of a long-term groundwater monitoring program in accordance with the Minnesota Solid Waste Landfill Compliance Program to assess trends in water quality downgradient of the landfill;
- 4) Installation of a surface drainage control system;
- 5) Performance of an in-situ bioremediation pilot study to determine site suitability for enhancing biodegradation of VOCs in ground water;
- 6) Relocation of 1.4 million cubic yards of refuse from an unlined area of the landfill to reduce the footprint of the unlined landfill; and
- 7) Installation of a pilot leachate dewatering system to remove perched leachate within the unlined portion of the landfill.

System Operation and Maintenance (O&M)

O&M at the Site is performed in accordance with the requirements of the facility's operating permit (Permit SW-045). All work at the site has been performed in accordance with the approved Final Permit Reissuance documents dated June 9, 1995, or subsequently revised in March 1997. Those documents included:

- Landfill Operation Plan;
- Groundwater Corrective Action Plan;
- Contingency Action Plan;
- Closure Plan;
- Postclosure Care Plan; and,
- Construction Inspection and QA/QC Programs

V. Progress Since the Last Review

Since the first review, which was completed on September 20, 2000, PBL has continued its operation of the waste disposal facility in accordance with its permit requirements. Construction of a new ten acre landfill cell (Phase IV.B) with a leachate collection system was completed in August of 2001. The pilot leachate dewatering system is now part of the long-term O&M of the closed landfill portions, and maintenance of the system is a requirement of the Pine Bend solid waste permit. The methane extraction system was expanded in the summer of 2001 with the addition of nine new methane gas extraction wells. The expansion was installed in the 39 acre lined area of Phase III. In 2002, three new methane gas extraction wells were installed in the 115 acre closed, unlined area of the landfill. In 2002, PBL installed and began operating a new leachate recovery system in Phases 1 and 2 of the landfill. Forty-six of the existing gas extraction wells were reconfigured to allow for simultaneous landfill gas and leachate recover. In 2003, a second leachate holding tank was installed at the south end of the landfill. The methane extraction system was also expanded in Phase 4 of the landfill with the installation of eight extraction wells. In January 12, 2004 a major modification of Permit SW-045 was approved by

MPCA. This modification revised the number monitoring locations, parameters, and frequency of sampling.

VI. Five-Year Review Process

Administrative Components

The PRPs were notified of the initiation of the five-year review on June 13, 2005. The Pine Bend Sanitary Landfill Site Five-Year Review was led by Tim Prendiville of the U.S. EPA, Remedial Project Manager for the Site and Robert Paulson, Community Involvement Coordinator. Joe Julik, of the MPCA, assisted in the review as the representative for the support agency.

The review, which began on November 16, 2004 consisted of the following components:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection; and,
- Five-Year Review Report Development and Review.

Community Involvement

Activities to involve the community in the five-year review were initiated in 2004 between the RPM and the Community Involvement Coordinator (CIC) for the Site. A notice was sent to a local newspaper that a five-year review was to be conducted. The notice was published in the Star Tribune (Minneapolis) on June 9, 2005, and invited the public to submit any comments to EPA. The results of the review and the report will be made available at the Site information repository located at the Wescott Branch Library, of the Dakota County Library System, in Eagan, Minnesota, and at the main office of the MPCA in St. Paul, Minnesota. No comments were received during this review.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and monitoring data (See Attachment 2).

Data Review

Groundwater

Pine Bend Sanitary Landfill (PBL) initiated operations under MPCA site permit SW-045 in 1971. PBL has been collecting groundwater quality information at, and adjacent to, the

landfill as part of PBL's Environmental Monitoring System (EMS) since 1971, when monitoring wells M-1, M-2, and M-3 were installed. PBL has collected 33 years of groundwater quality data. The EMS requires that PBL submit annual water quality reports to MPCA, as specified by Minnesota Solid Waste Rule 7035.2815, subpart 14, item P as contained in the Required Actions and Submittals Table of the permit.

An extensive monitoring well network, shown in Attachment 3, is used for water level measurements and water quality sampling at the Site. Attachment 4 is a figure showing the plume orientation based on the 2004 Annual Water Quality Monitoring Report.

PBL's current EMS monitoring well locations, sampling frequency, and analytical parameters were established in 2004 following a major modification to Permit SW-045 by the MPCA on January 12, 2004. The network consists of 18 monitoring wells and 2 springs located near the Mississippi River. In addition, a three times per year sampling frequency (spring, summer, fall) was applied to all EMS wells and springs. Groundwater levels are measured in association with the three sampling events. Groundwater samples collected during the three monitoring events are analyzed for indicator parameters (pH, temperature, specific conductance, and redox potential) and volatile organic compounds (VOCs). In addition, groundwater samples collected during the summer monitoring event are analyzed for inorganics and dissolved metals. In accordance with the re-issuance of Permit SW-045, Intervention Limits (ILs) are the water quality standards for PBL. Attachment 5 presents the permit required applicable ILs for various organic and inorganic parameters. Trends in groundwater quality are characterized by changes observed in indicator parameter measurements, inorganic, metal and VOC concentrations.

Attachment 6 presents IL exceeding values recorded at PBL in 2004. Groundwater samples analyzed from the monitoring network included a total of five metals that exceeded groundwater ILs in July 2004. These metals consisted of arsenic (well M-5B), barium (well M-5B), boron (well M-46), manganese (wells M-5B, M-6, M-23, M-28, M-46, M-47, and M-48), and nickel (wells M-46 and M-47). All five metals are naturally occurring metals which may be released from the aquifer materials to the groundwater via anaerobic or reducing conditions from the landfill leachate. Nitrate also exceeded the IL value at one well during 2004.

A total of 10 VOCs exceeded IL values during the 2004 monitoring events.

| | |
|------------------------------|--|
| 1,4-Dichlorobenzene | (M-5B) |
| 1,2-Dichloroethane | (M-26, M-28, M-30, and M-47) |
| Tetrahydrofuran | (M-26 and M-47) |
| Tetrachloroethane (TCA) | (M-26, M-28, M-29, M-38, M-47, and M-49) |
| Cis-1,2-Dichloroethane (DCA) | (M-26, M-28, M-38, M-47, M-49) |
| Benzene | (M-30) |
| Vinyl Chloride (VC) | (M-15, M-26, M-28, M-30, M-38, M-42, M-47, and M-49) |
| 1,1-Dichloroethane | (M-26 and M-28) |
| 1,2-Dichloropropane | (M-26, M-28, M-30, M-38, M-46, and M-49) |
| Trichloroethene (TCE) | (M-38) |

Several lines of evidence indicate that microbial metabolism of VOC contaminants is at least partially responsible for the improvement of water quality in the aquifer near the site. There has been a general trend of decreasing VOC concentrations located adjacent to the landfill that include a marked decline, or non-detection, of chloroethane parent compounds (PCE and TCE) and the appearance of degradation products (c-DCE and VC). Over a 10-year period (1995-2004), PCE and TCE concentrations have decreased substantially resulting in the production of c-DCE. At wells M-38, CFC-12 concentrations have decreased, while c-DCE concentrations have increased slightly. This suggests that chloroethane degradation is taking place in the aquifer. These trends are also seen for vinyl chloride with concentrations of vinyl chloride at well M-5B dropping from a high of 44 parts per billion to below detection limits. Lower redox potential readings in the area east of the landfill with associated increased dissolved iron and manganese along with a decrease of total organic carbon also point to biodegradation occurring. Finally there is evidence of increased alkalinity in portions of the plume most likely due to increased carbon dioxide output from microbial metabolism.

In 2004, average total VOC concentrations for the spring, summer and fall sampling events were 1,673 parts per billion (ppb). However four additional monitoring points were added to the EMS in 2004 and contributed to this total. When compared to the 2003 network, 2004 total VOCs were actually 1300 ppb, and less than the previous 2003 recorded low of 1,577 ppb. In general, continued declines in total VOC concentrations in wells located adjacent to the landfill. However, substantial declines in total VOC concentrations took place in downgradient wells that are located at a greater distance from the landfill (e.g. M-26). This relationship is consistent with a time-delayed response to groundwater chemical transport.

The ongoing decreases in total VOC concentrations is attributable to the effectiveness of the landfill cap, enhanced leachate recovery implemented in 2002, along with microbial degradation of the compounds.

The SW045 permit identifies ground water standards, compliance points, monitoring and corrective measures that must be implemented to achieve and (once achieved) maintain ground water standards at the facility.

Leachate

The existing telemetry controlled leachate extraction system was installed in Phases 1 and 2 in August 2002 through October 2002. Because this portion of the landfill is unlined, successful leachate extraction is vital in source control for the groundwater and in reducing leachate from the landfill mound. Forty-six of the existing gas extraction wells were reconfigured to allow for simultaneous landfill gas and leachate recovery. Site data show a continued reduction in leachate levels throughout the second half of 2002 and throughout 2003 and 2004. Eighteen wells have less than 10 feet of leachate, fourteen extraction wells have 10 to 20 feet of leachate, and only two wells have 20 to 30 feet of leachate present. Leachate levels in the extraction wells have decreased an average of 25 feet per well from the 2002 measurements. In 2004, approximately 782,892 gallons of leachate were removed via the vertical extraction

wells in Phases 1 and 2.

Landfill Gas

Pine Bend Landfill has installed and currently operates a gas collection and control system (GCCS) for the areas filled to final grade. The existing GCCS consists of 159 vertical extraction wells in the final grade and active fill areas. These extraction wells convey the landfill gas (LFG) from the refuse, through a series of lateral and header pipes to a gas to energy facility.

The vertical extraction wells are generally positioned on the landfill plateau. Later and header pipes are generally installed below grade and are constructed of high-density polyethylene (HDPE) pipe. The LFG is conveyed through this pipe network to the gas to energy facility located on the northwest side of the facility. The average spacing between the wells is approximately 150 to 200 feet. Operations of the gas to energy facility are monitored continuously.

Surface emissions monitoring is conducted quarterly using flame ionization detectors. Testing is conducted around the perimeter of the collection area and in a serpentine pattern across the collection area. In addition, any areas where visual observations indicate potentially elevated concentrations of methane are also screened. No exceedances of the methane standard of 500 ppm have been reported.

An annual performance test of the GCCS control device is required per the Air Emission Permit No. 03700138-002. The performance test establishes operation criteria based on the type of control device to maintain a 98% destruction efficiency of non-methane organic compounds (NMOCs).

The control device for the gas to energy facility at the Pine Bend Landfill consists of two stationary turbines with a total rated capacity of 2,500 standard cubic feet per minute (scfm), two blowers with a total rated capacity of 3,200 to 10,500 scfm, two compressors with a total rated capacity of approximately 6,500 scfm, and one enclosed flare. Test results demonstrated the flare and the stack are operating in compliance with the New Source Performance Standards (NSPS) and Minnesota Rule 7011.3510 emission limitations.

Site Inspection

Dakota County Environmental Management (Dakota County) performs biweekly inspections of the land disposal facility. MPCA performed its own inspection of the facility on November 16, 2004. In attendance were Jeff Brown, BFI; Katie Koelfgen, MPCA; Geoff Strack, MPCA; Mike Lynn, MPCA; Darryl Weakley, MPCA.

Over the last year only one violation was observed by Dakota County involving the failure to follow the waste acceptance plan. The landfill had accepted asbestos contaminated fill material. Subsequent to the Dakota County's inspection and the violation notice PBL arranged

for the off-site disposal of the material and instituted changes to its waste acceptance procedures. Other minor issues were noted in the inspections, but those were resolved by the following inspection date. MPCA's inspection noted a large area of inadequate daily cover and exposed waste. That area now has adequate cover. All other aspects of the remedy were considered to be in compliance.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The review of documents, risk assumptions, and the results of the site inspection indicates that the on-site equipment is functioning as intended. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the health assessment, and there have been no changes to the standardized health assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

Operation and maintenance of the landfill cover and drainage structures has been effective. The landfill gas collection and control system and leachate collection system both have been effective in the management of potential risks associated with exposure to, or releases of, landfill gas and leachate.

Groundwater data has shown that contaminant concentrations have been dropping and natural attenuation may be effectively controlling contaminant concentrations within the aquifer beneath the Site and off-site. The map in Attachment 9 shows the area of the groundwater plume.

U.S. EPA's concurrence in the ROD for OU2 was based on the fact that closure and post-closure requirements would be implemented and maintained at the Site pursuant to state permit. The operating permit for the landfill has significant language regarding land use restrictions at the Site. Specifically the permit modification of SW-045 permit (January 12, 2004) requires the permittee to comply with postclosure use of property requirements in accordance with Minn. R. 7035.2655, subp. 2, which states: .

Subp. 2. Postclosure use of property. The landowner must not allow postclosure use of the facility property to disturb the integrity of final covers, liners, or any other components of any containment system, or the function of the facility's monitoring system, unless the commissioner determines that the disturbance: A. is necessary to the proposed use of the property and will not cause a violation of the standards outlined in parts 7035.2565 and 7035.2815, subpart 4; and B. is necessary to remedy a violation of the standards in parts 7035.2565 and 7035.2815, subpart 4.

The permittee should be required to execute a restrictive covenant that runs with the land to

implement these land use restrictions as part of postclosure requirements.

The ROD for OU2 required all homes in the area at the time of the ROD to be hooked up to municipal water, and all private wells to be properly abandoned. A review of the Dakota County well inventory for the area downgradient of the landfill shows that seven wells still exist in the area possibly impacted by the groundwater plume from the site. Six of the wells are located at industrial facilities and one is at a residence. All of the properties have been connected to municipal water and the wells are not used for potable purposes. The residential well is used for irrigation.

The ROD for OU1 referred to Minnesota Plumbing Code, Section 4715.0310 as providing the City with authority to require connection to the extended system by residents. The Inver Grove Heights Code does not mandate connection to the water system (Section 705.31), however new wells require a state license and city permit prior to construction of a water well under Section 715 of the Inver Grove Heights Code. In addition the Minnesota Department of Health has instituted a Special Well Construction Area encompassing this site. Minnesota Rule 4725 states that all wells to be constructed in a well advisory area must have prior review and approval by the State before being constructed. The City and the State have the authority to prevent potable water use for any new wells under the licensing and permitting authorities described above.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Changes in Standards

Because the Record of Decision for this site required no additional remedial action, no ARARs were identified for the site. The ROD requires that the site be addressed under the Minnesota Solid Waste Landfill Compliance Program, the Resource Conservation and Recovery Act, and the Response Order by Consent. MPCA continues to effectively address the risks posed by the site under their programs. There have been no changes in remedial action objectives affecting the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity, and other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current exposures and potential future exposures for workers and off-site residential groundwater users. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change in the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedy. No weather-related events have affected the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed and the site inspection the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Because the remedy selected for this site was No Action no ARARs were cited in the ROD. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 3: Issues

| Issues | Affects Current Protectiveness (Y/N) | Affects Future Protectiveness (Y/N) |
|---|---|--|
| Groundwater wells still exist within groundwater plume area | N | Y |

IX. Recommendations and Follow-up Actions

Table 4: Recommendations and Follow-up Actions

| Issue | Recommendations and Follow-up Actions | Party Responsible | Oversight Agency | Milestone Date | Affects Protectiveness (Y/N) | |
|---|---|-------------------|------------------|----------------|------------------------------|--------|
| | | | | | Current | Future |
| Groundwater wells still exist within groundwater plume area | IC Plan to require abandonment of existing wells and/or implementation of groundwater use restrictions to ensure the wells won't be used for potable purposes. City and State have authority to prevent construction and/or water use of wells via their licensing authority. | MPCA | MPCA | 03/30/06 | N | Y |

X. Protectiveness Statement

The remedy at the Pine Bend Sanitary Landfill Site is currently protective of human health and the environment due to the connection of residences to the extended municipal water supply system in the affected groundwater area and due to effective actions taken under permits issued through the Minnesota Solid Waste Landfill Compliance Program and under a Response Order issued by MPCA. The long term protectiveness at the site requires: 1) continued compliance with the PBSL solid waste permit, which includes requirements for monitoring, closure, post-closure, groundwater corrective action and land use restrictions on the PBSL; and 2) restrictions on potable groundwater use in the groundwater plume area.

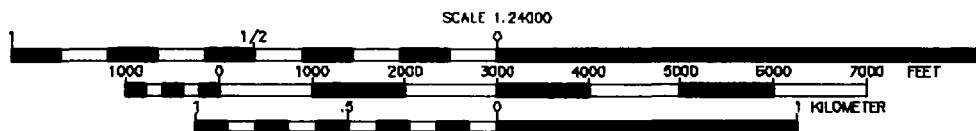
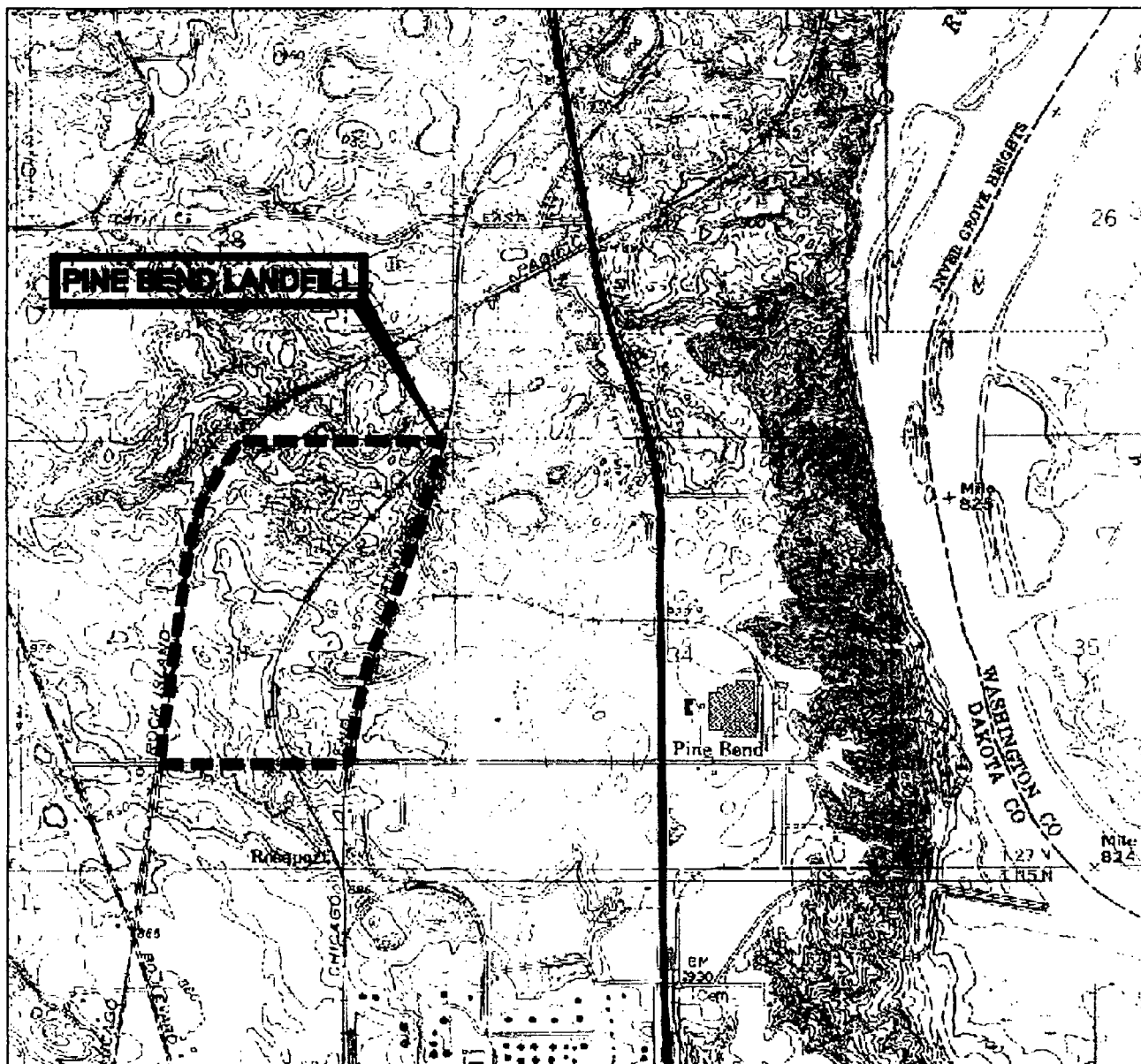
XI. Next Review

The next five-year review for the Pine Bend Sanitary Landfill Site is required by September 2010, five years from the signature date of this review.

Attachment 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INVER GROVE HEIGHTS QUADRANGLE
MINNESOTA
7.5 MINUTE SERIES (TOPOGRAPHIC)
1967 REVISED 1993



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

EnecoTech

Project: BFI

PINE BEND LANDFILL
INVER GROVE HEIGHTS, MINNESOTA

SITE LOCATION MAP

| | | | |
|--------------------|-------------------------|---------------|--------------|
| File No.: 1444-001 | ACAD File No.: 1444001F | Date: 6/16/00 | REV: |
| Drawn By: KAT | Design By: | Checked By: | Approved By: |
| | | | FIG. NO. 1 |

Attachment 2

Documents Reviewed

U.S. EPA, "Minnesota Decision Document, Pine Bend Sanitary Landfill, Dakota County, Minnesota, Operable Unit 2: Source Control and Groundwater Contamination", September 28, 1995.

EMCON/OWT Solid Waste Services, "Landfill Gas Collection and Control System, 2001 Annual Report", February 1, 2002.

BFI, Pine Bend Landfill, "2004 Annual Report for the Pine Bend Landfill, SW-45", January 31, 2005.

BFI, Pine Bend Landfill, "2003 Annual Report for the Pine Bend Landfill, SW-45", January 30, 2004.

BFI, Pine Bend Landfill, "2002 Annual Report for the Pine Bend Landfill, SW-45", January 31, 2003.

BFI, Pine Bend Landfill, "2001 Annual Report for the Pine Bend Landfill, SW-45", January 31, 2002.

MPCA, "Reissuance of Permit SW-045 for the Construction and Operation of a Solid Waste Disposal Facility", September 15, 1997.

ATSDR, "Public Health Assessment for Pine Bend Sanitary Landfill", April 13, 1992.

Dakota County Environmental Management, "Solid Waste Inspection Report", January 16, 2004 through December 16, 2004.

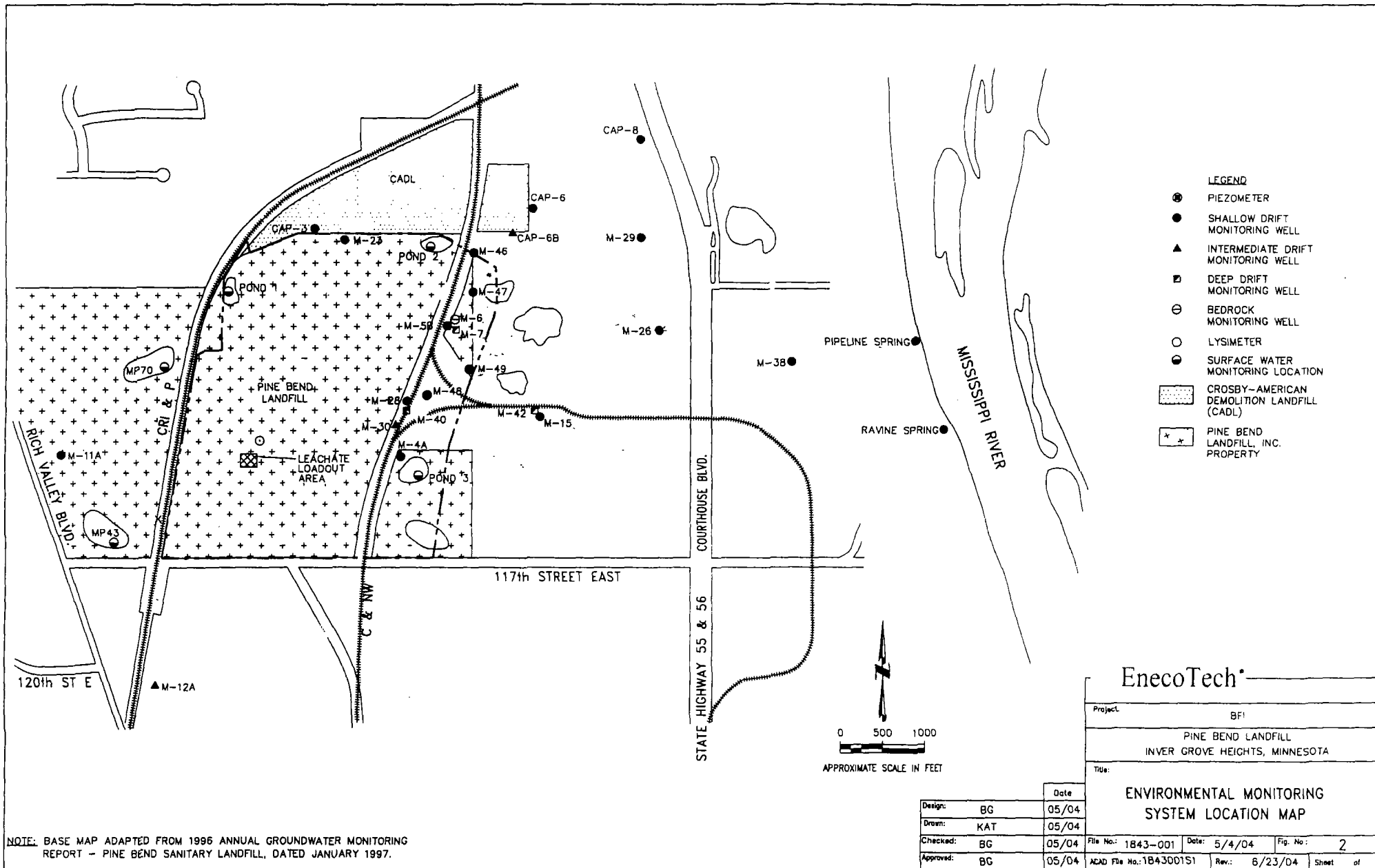
MPCA, "Five-Year Review for Pine Bend Landfill", September 20, 2000.

Harding Lawson, "Remedial Investigaton (RI) - Vol 1", December 1, 1986.

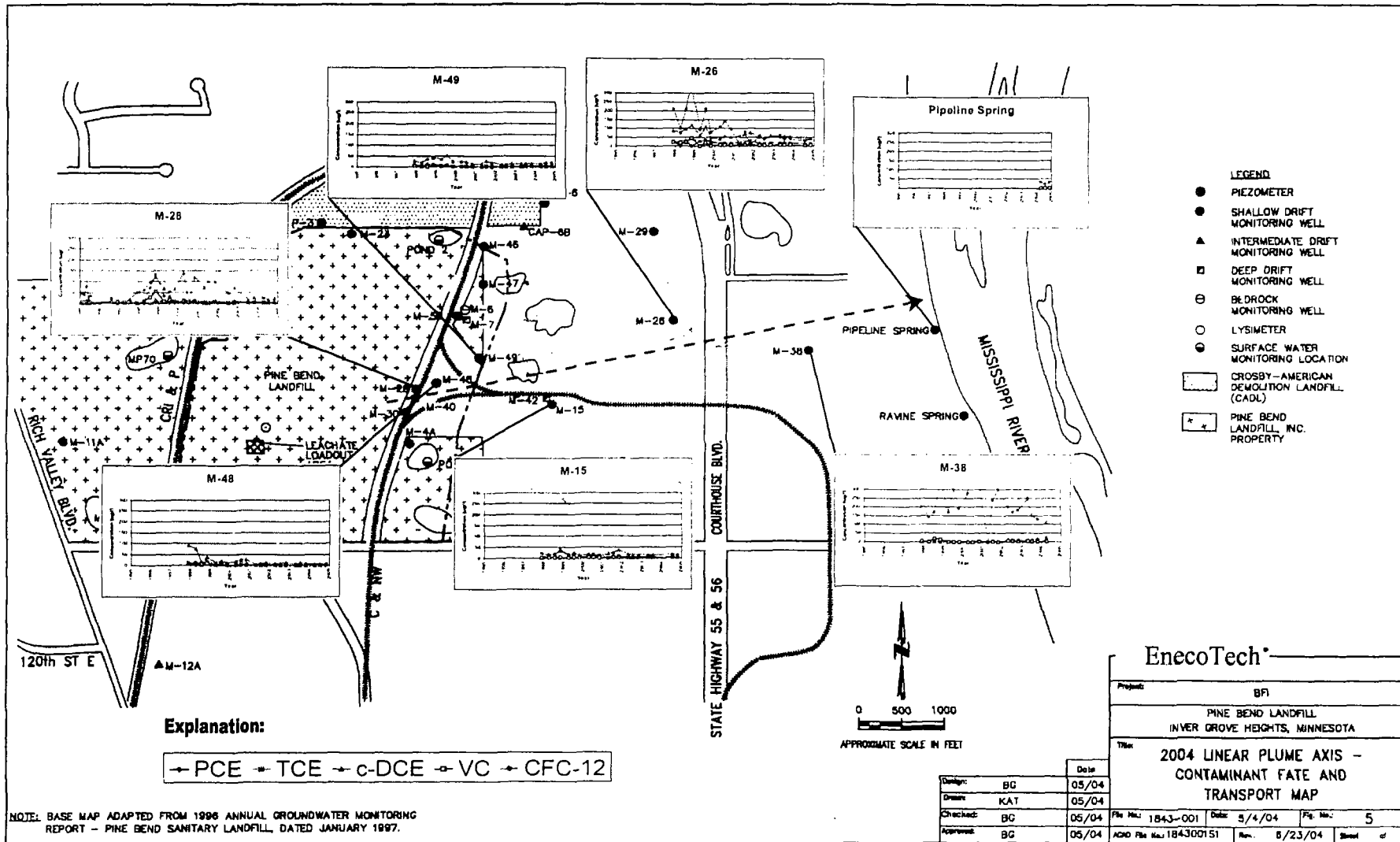
MPCA, "Record of Decision (ROD) Operable Unit 1- Pine Bend Sanitary Landfill", September 30, 1991.

MPCA, "Response Order by Consent - Pine Bend Landfill", April 23, 1985

Attachment 3



Attachment 4



Attachment 5

Table 2. Groundwater Intervention Limits (ILs) for Pine Bend Landfill

| Parameter | CAS | IL | unit |
|---|------------|--------|------|
| 1,1,1,2-Tetrachloroethane | 630-20-6 | 17.5 | ug/l |
| 1,1,1-Trichloroethane | 71-55-6 | 150 | ug/l |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.50 | ug/l |
| 1,1,2-Trichloroethane | 79-00-5 | 0.75 | ug/l |
| 1,1,2-Trichlorotrifluoroethane | 76-13-1 | 50,000 | ug/l |
| 1,1-Dichloroethane | 75-34-3 | 17.5 | ug/l |
| 1,1-Dichloroethylene (Vinylidene chloride) | 75-35-4 | 1.5 | ug/l |
| 1,1-Dichloropropene | 563-58-6 | -- | |
| 1,2-(trans-) Dichloroethylene | 156-60-5 | 25.0 | ug/l |
| 1,2,3-Trichloropropane | 96-18-4 | 10.0 | ug/l |
| 1,2-Dibromoethane (Ethylene dibromide) EDB | 106-93-4 | 0.001 | ug/l |
| 1,2-Dichlorobenzene (ortho-) | 95-50-1 | 150 | ug/l |
| 1,2-Dichloroethane | 107-06-2 | 1.0 | ug/l |
| 1,2-Dichloroethylene (cis-) | 156-59-2 | 17.5 | ug/l |
| 1,2-Dichloropropane | 78-87-5 | 1.25 | ug/l |
| 1,3-Dichlorobenzene (meta-) | 541-73-1 | 150 | ug/l |
| 1,3-Dichloropropane | 142-28-9 | -- | |
| 1,3-Dichloropropene (cis + trans) | 100-61-015 | 0.50 | ug/l |
| 1,4-Dichlorobenzene (para-) | 106-46-7 | 2.5 | ug/l |
| 2,2-Dichloropropane | 594-20-7 | -- | |
| 2-Chlorotoluene (ortho-) | 95-49-8 | -- | |
| 4-Chlorotoluene (para-) | 106-43-4 | -- | |
| Acetone | 67-64-1 | 175 | ug/l |
| Allyl chloride (3 chloropropene) | 107-05-1 | 7.5 | ug/l |
| Benzene | 71-43-2 | 2.5 | ug/l |
| Bromobenzene | 108-86-1 | -- | |
| Bromochloromethane (Chlorobromomethane) | 74-97-5 | -- | |
| Bromodichloromethane (Dichlorobromomethane) | 75-27-4 | 1.5 | ug/l |
| Bromoform | 75-25-2 | 10.0 | ug/l |
| Bromomethane (Methyl bromide) | 74-83-9 | 2.5 | ug/l |
| Carbon tetrachloride | 56-23-5 | 0.75 | ug/l |
| Chlorobenzene (monochlorobenzene) | 108-90-7 | 25.0 | ug/l |
| Chlorodibromomethane (Dibromochloromethane) | 124-48-1 | 2.5 | ug/l |
| Chloroethane | 75-00-3 | -- | |
| Chloroform | 67-66-3 | 15.0 | ug/l |
| Chloromethane (Methyl chloride) | 74-87-3 | -- | |
| Cumene (Isopropylbenzene) | 98-82-8 | 75.0 | ug/l |
| Dibromochloropropane (DBCP) | 96-12-8 | 0.05 | ug/l |
| Dibromomethane (Methylene bromide) | 74-95-3 | -- | |
| Dichlorodifluoromethane | 75-71-8 | 250 | ug/l |
| Dichlorofluoromethane | 75-43-4 | -- | |
| Dichloromethane (Methylene chloride) | 75-09-2 | 12.5 | ug/l |
| Ethyl benzene | 100-41-4 | 175 | ug/l |
| Ethyl ether | 60-29-7 | 250 | ug/l |
| Hexachlorobutadiene | 87-68-3 | 0.25 | ug/l |
| Methyl ethyl ketone (MEK) | 78-93-3 | 1,000 | ug/l |
| Methyl isobutyl ketone (4-Methyl-2-pentanone) | 108-10-1 | 75.0 | ug/l |
| Methyl tertiary-Butyl Ether (MTBE) | 1634-04-4 | -- | |
| Naphthalene | 91-20-3 | 75.0 | ug/l |
| n-Butyl Benzene | 104-51-8 | -- | |
| n-Propyl benzene | 103-65-1 | -- | |
| p-Isopropyltoluene | 99-87-6 | -- | |
| sec-Butyl Benzene | 135-98-8 | -- | |
| Styrene | 100-42-5 | 25.0 | ug/l |
| tert-Butyl Benzene | 98-06-6 | -- | |

| | | | |
|---|------------|-------|------|
| Tetrachloroethylene (Perchloroethylene) | 127-18-4 | 1.75 | ug/l |
| Tetrahydrofuran | 109-99-9 | 25.0 | ug/l |
| Toluene | 108-88-3 | 250 | ug/l |
| Trichloroethylene (TCE) | 79-01-6 | 7.5 | ug/l |
| Trichlorofluoromethane | 75-69-4 | 500 | ug/l |
| Vinyl chloride (chloroethene) | 75-01-4 | 0.05 | ug/l |
| Xylenes (mixture of o,m,p) | 1330-20-7 | 2,500 | ug/l |
| Dissolved Oxygen,Field | T-1-05 | -- | |
| Eh (Oxidation potential) | 4 | -- | |
| pH | C-0-06 | -- | |
| Specific Conductance | C-0-11 | -- | |
| Static Water Level | PCA-00-1 | -- | |
| Temperature | T-1-21 | -- | |
| Turbidity Field | G-0-19 | -- | |
| Ammonia Nitrogen | 7664-41-7 | -- | |
| Arsenic | 7440-38-2 | 12.5 | ug/l |
| Barium | 7440-39-3 | 500 | ug/l |
| Boron | 7440-42-8 | 150 | ug/l |
| Cadmium | 7440-43-9 | 1.0 | ug/l |
| Chloride | 16887-00-6 | -- | |
| Chromium (total) (Chromium VI) | 18540-29-9 | 25.0 | ug/l |
| Chromium III | 10025-73-7 | 5,000 | ug/l |
| Copper | 7440-50-8 | 250 | ug/l |
| Iron | 7439-89-6 | -- | |
| Lead | 7439-92-1 | -- | |
| Magnesium | 7439-95-4 | -- | |
| Manganese | 7439-96-5 | 450 | ug/l |
| Mercury | 7439-97-6 | 0.50 | ug/l |
| Nickel | 7440-02-0 | 25.0 | ug/l |
| Nitrate (as Nitrogen) | 14797-55-8 | 2,500 | ug/l |
| Nitrite (as Nitrogen) | 14797-65-0 | 250 | ug/l |
| Potassium | 7440-09-7 | -- | |
| Selenium | 7782-49-2 | 12.5 | ug/l |
| Silver | 7440-22-4 | -- | |
| Sodium | 7440-23-5 | -- | |
| Sulfate | 14808-79-8 | -- | |
| Zinc | 7440-66-6 | 500 | ug/l |

Attachment 6

Table 8. 2004 Groundwater Intervention Limit Data

| Well Name | Date Sampled | Parameter | Result | Intervention Limit | Units | CAS No |
|-----------|--------------|-------------------------|--------|--------------------|-------|------------|
| M-11A | 7/13/04 | Chromium | 3.6 | 5,000 | ug/l | 7440-47-3 |
| M-11A | 7/13/04 | Nitrogen, Nitrate | 3,400 | 2,500 | ug/l | 14797-55-8 |
| M-15 | 7/16/04 | 1,1-Dichloroethane | 7.4 | 17.5 | ug/l | 75-34-3 |
| M-15 | 7/16/04 | 1,2-Dichloropropane | 1.1 | 1.3 | ug/l | 78-87-5 |
| M-15 | 7/16/04 | cis-1,2-Dichloroethene | 17 | 17.5 | ug/l | 156-59-2 |
| M-15 | 7/16/04 | Tetrachloroethene | 1.3 | 1.75 | ug/l | 127-18-4 |
| M-15 | 7/16/04 | Vinyl Chloride | 1.6 | 0.05 | ug/l | 75-01-4 |
| M-15 | 10/22/04 | 1,1-Dichloroethane | 6.7 | 17.5 | ug/l | 75-34-3 |
| M-15 | 10/22/04 | 1,2-Dichloropropane | 1.1 | 1.3 | ug/l | 78-87-5 |
| M-15 | 10/22/04 | cis-1,2-Dichloroethene | 14 | 17.5 | ug/l | 156-59-2 |
| M-15 | 10/22/04 | Tetrachloroethene | 1.6 | 1.75 | ug/l | 127-18-4 |
| M-15 | 10/22/04 | Vinyl Chloride | 1.4 | 0.05 | ug/l | 75-01-4 |
| M-23 | 7/13/04 | Manganese | 350 | 250 | ug/l | 7439-96-5 |
| M-26 | 4/9/04 | 1,1-Dichloroethane | 20 | 17.5 | ug/l | 75-34-3 |
| M-26 | 4/9/04 | 1,2-Dichloroethane | 1.1 | 1.0 | ug/l | 107-06-2 |
| M-26 | 4/9/04 | 1,2-Dichloropropane | 8.3 | 1.3 | ug/l | 78-87-5 |
| M-26 | 4/9/04 | cis-1,2-Dichloroethene | 48 | 17.5 | ug/l | 156-59-2 |
| M-26 | 4/9/04 | Tetrachloroethene | 17 | 1.75 | ug/l | 127-18-4 |
| M-26 | 4/9/04 | Tetrahydrofuran | 41 | 25 | ug/l | 109-99-9 |
| M-26 | 4/9/04 | Trichloroethene | 17 | 7.5 | ug/l | 79-01-6 |
| M-26 | 4/9/04 | Vinyl Chloride | 4.8 | 0.05 | ug/l | 75-01-4 |
| M-26 | 7/19/04 | 1,1-Dichloroethane | 18 | 17.5 | ug/l | 75-34-3 |
| M-26 | 7/19/04 | 1,2-Dichloropropane | 5.9 | 1.3 | ug/l | 78-87-5 |
| M-26 | 7/19/04 | cis-1,2-Dichloroethene | 38 | 17.5 | ug/l | 156-59-2 |
| M-26 | 7/19/04 | Dichlorodifluoromethane | 30 | 250 | ug/l | 75-71-8 |
| M-26 | 7/19/04 | Tetrachloroethene | 13 | 1.75 | ug/l | 127-18-4 |
| M-26 | 7/19/04 | Tetrahydrofuran | 38 | 25 | ug/l | 109-99-9 |
| M-26 | 7/19/04 | Trichloroethene | 12 | 7.5 | ug/l | 79-01-6 |
| M-26 | 7/19/04 | Vinyl Chloride | 3.8 | 0.05 | ug/l | 75-01-4 |
| M-26 | 10/25/04 | 1,1-Dichloroethane | 22 | 17.5 | ug/l | 75-34-3 |
| M-26 | 10/25/04 | 1,2-Dichloroethane | 1.1 | 1.0 | ug/l | 107-06-2 |
| M-26 | 10/25/04 | 1,2-Dichloropropane | 7.3 | 1.3 | ug/l | 78-87-5 |
| M-26 | 10/25/04 | cis-1,2-Dichloroethene | 46 | 17.5 | ug/l | 156-59-2 |
| M-26 | 10/25/04 | Dichlorodifluoromethane | 38 | 250 | ug/l | 75-71-8 |
| M-26 | 10/25/04 | Tetrachloroethene | 17 | 1.75 | ug/l | 127-18-4 |
| M-26 | 10/25/04 | Tetrahydrofuran | 41 | 25 | ug/l | 109-99-9 |
| M-26 | 10/25/04 | Trichloroethene | 15 | 7.5 | ug/l | 79-01-6 |
| M-26 | 10/25/04 | Vinyl Chloride | 4.7 | 0.05 | ug/l | 75-01-4 |
| M-28 | 4/8/04 | 1,1-Dichloroethane | 5.8 | 17.5 | ug/l | 75-34-3 |
| M-28 | 4/8/04 | 1,2-Dichloroethane | 1.6 | 1.0 | ug/l | 107-06-2 |
| M-28 | 4/8/04 | 1,2-Dichloropropane | 2.3 | 1.3 | ug/l | 78-87-5 |
| M-28 | 4/8/04 | cis-1,2-Dichloroethene | 26 | 17.5 | ug/l | 156-59-2 |
| M-28 | 4/8/04 | Tetrachloroethene | 2.5 | 1.75 | ug/l | 127-18-4 |
| M-28 | 4/8/04 | Tetrahydrofuran | 6.0 | 25 | ug/l | 109-99-9 |
| M-28 | 4/8/04 | Trichloroethene | 5.1 | 7.5 | ug/l | 79-01-6 |
| M-28 | 4/8/04 | Vinyl Chloride | 1.3 | 0.05 | ug/l | 75-01-4 |
| M-28 | 7/9/04 | 1,1-Dichloroethane | 3.9 | 17.5 | ug/l | 75-34-3 |
| M-28 | 7/9/04 | 1,2-Dichloroethane | 1.1 | 1.0 | ug/l | 107-06-2 |
| M-28 | 7/9/04 | 1,2-Dichloropropane | 1.4 | 1.3 | ug/l | 78-87-5 |
| M-28 | 7/9/04 | cis-1,2-Dichloroethene | 14 | 17.5 | ug/l | 156-59-2 |
| M-28 | 7/9/04 | Manganese | 850 | 250 | ug/l | 7439-96-5 |
| M-28 | 7/9/04 | Tetrachloroethene | 1.2 | 1.75 | ug/l | 127-18-4 |
| M-28 | 7/9/04 | Trichloroethene | 1.8 | 7.5 | ug/l | 79-01-6 |
| M-28 | 10/27/04 | 1,1-Dichloroethane | 5.3 | 17.5 | ug/l | 75-34-3 |
| M-28 | 10/27/04 | 1,2-Dichloroethane | 1.8 | 1.0 | ug/l | 107-06-2 |

Table 8. 2004 Groundwater Intervention Limit Data

| Well Name | Date Sampled | Parameter | Result | Intervention Limit | Units | CAS No |
|-----------|--------------|------------------------|--------|--------------------|-------|-----------|
| M-28 | 10/27/04 | 1,2-Dichloropropane | 1.5 | 1.3 | ug/l | 78-87-5 |
| M-28 | 10/27/04 | cis-1,2-Dichloroethene | 21 | 17.5 | ug/l | 156-59-2 |
| M-28 | 10/27/04 | Tetrachloroethene | 2.6 | 1.75 | ug/l | 127-18-4 |
| M-28 | 10/27/04 | Trichloroethene | 2.7 | 7.5 | ug/l | 79-01-6 |
| M-28 | 10/27/04 | Vinyl Chloride | 1.6 | 0.05 | ug/l | 75-01-4 |
| M-29 | 4/9/04 | Tetrachloroethene | 2.6 | 1.75 | ug/l | 127-18-4 |
| M-29 | 7/13/04 | 1,1-Dichloroethane | 1.5 | 17.5 | ug/l | 75-34-3 |
| M-29 | 7/13/04 | Manganese | 10 | 250 | ug/l | 7439-96-5 |
| M-29 | 7/13/04 | Tetrachloroethene | 2.5 | 1.75 | ug/l | 127-18-4 |
| M-29 | 10/22/04 | 1,1-Dichloroethane | 1.6 | 17.5 | ug/l | 75-34-3 |
| M-29 | 10/22/04 | Tetrachloroethene | 2.8 | 1.75 | ug/l | 127-18-4 |
| M-30 | 7/9/04 | 1,2-Dichloroethane | 2.2 | 1.0 | ug/l | 107-06-2 |
| M-30 | 7/9/04 | 1,2-Dichloropropane | 6.5 | 1.3 | ug/l | 78-87-5 |
| M-30 | 7/9/04 | Benzene | 3.7 | 2.5 | ug/l | 71-43-2 |
| M-30 | 7/9/04 | Vinyl Chloride | 2.3 | 0.05 | ug/l | 75-01-4 |
| M-30 | 10/28/04 | 1,2-Dichloroethane | 1.3 | 1.0 | ug/l | 107-06-2 |
| M-30 | 10/28/04 | 1,2-Dichloropropane | 4.4 | 1.3 | ug/l | 78-87-5 |
| M-30 | 10/28/04 | Benzene | 1.7 | 2.5 | ug/l | 71-43-2 |
| M-30 | 10/28/04 | Vinyl Chloride | 1.7 | 0.05 | ug/l | 75-01-4 |
| M-38 | 4/9/04 | 1,1-Dichloroethane | 22 | 17.5 | ug/l | 75-34-3 |
| M-38 | 4/9/04 | 1,2-Dichloropropane | 5.6 | 1.3 | ug/l | 78-87-5 |
| M-38 | 4/9/04 | cis-1,2-Dichloroethene | 26 | 17.5 | ug/l | 156-59-2 |
| M-38 | 4/9/04 | Tetrachloroethene | 6.2 | 1.75 | ug/l | 127-18-4 |
| M-38 | 4/9/04 | Trichloroethene | 8.0 | 7.5 | ug/l | 79-01-6 |
| M-38 | 4/9/04 | Vinyl Chloride | 3.7 | 0.05 | ug/l | 75-01-4 |
| M-42 | 10/22/04 | Vinyl Chloride | 1.4 | 0.05 | ug/l | 75-01-4 |
| M-46 | 4/6/04 | 1,1-Dichloroethane | 7.7 | 17.5 | ug/l | 75-34-3 |
| M-46 | 4/6/04 | 1,2-Dichloropropane | 2.7 | 1.3 | ug/l | 78-87-5 |
| M-46 | 4/6/04 | cis-1,2-Dichloroethene | 4.3 | 17.5 | ug/l | 156-59-2 |
| M-46 | 7/15/04 | 1,1-Dichloroethane | 8.9 | 17.5 | ug/l | 75-34-3 |
| M-46 | 7/15/04 | 1,2-Dichloropropane | 3.2 | 1.3 | ug/l | 78-87-5 |
| M-46 | 7/15/04 | Benzene | 1.3 | 2.5 | ug/l | 71-43-2 |
| M-46 | 7/15/04 | Boron | 230 | 150 | ug/l | 7440-42-8 |
| M-46 | 7/15/04 | cis-1,2-Dichloroethene | 2.5 | 17.5 | ug/l | 156-59-2 |
| M-46 | 7/15/04 | Manganese | 4,600 | 250 | ug/l | 7439-96-5 |
| M-46 | 7/15/04 | Nickel | 58 | 25 | ug/l | 7440-02-0 |
| M-46 | 10/27/04 | 1,1-Dichloroethane | 8.5 | 17.5 | ug/l | 75-34-3 |
| M-46 | 10/27/04 | 1,2-Dichloropropane | 3.6 | 1.3 | ug/l | 78-87-5 |
| M-46 | 10/27/04 | cis-1,2-Dichloroethene | 1.6 | 17.5 | ug/l | 156-59-2 |
| M-47 | 4/12/04 | 1,1-Dichloroethane | 11 | 17.5 | ug/l | 75-34-3 |
| M-47 | 4/12/04 | 1,2-Dichloroethane | 2.3 | 1.0 | ug/l | 107-06-2 |
| M-47 | 4/12/04 | 1,2-Dichloropropane | 10 | 1.3 | ug/l | 78-87-5 |
| M-47 | 4/12/04 | cis-1,2-Dichloroethene | 31 | 17.5 | ug/l | 156-59-2 |
| M-47 | 4/12/04 | Tetrachloroethene | 22 | 1.75 | ug/l | 127-18-4 |
| M-47 | 4/12/04 | Tetrahydrofuran | 34 | 25 | ug/l | 109-99-9 |
| M-47 | 4/12/04 | Trichloroethene | 27 | 7.5 | ug/l | 79-01-6 |
| M-47 | 4/12/04 | Vinyl Chloride | 5.0 | 0.05 | ug/l | 75-01-4 |
| M-47 | 7/15/04 | 1,1-Dichloroethane | 11 | 17.5 | ug/l | 75-34-3 |
| M-47 | 7/15/04 | 1,2-Dichloroethane | 2.2 | 1.0 | ug/l | 107-06-2 |
| M-47 | 7/15/04 | 1,2-Dichloropropane | 9.7 | 1.3 | ug/l | 78-87-5 |
| M-47 | 7/15/04 | Benzene | 1.5 | 2.5 | ug/l | 71-43-2 |
| M-47 | 7/15/04 | Boron | 77 | 150 | ug/l | 7440-42-8 |
| M-47 | 7/15/04 | cis-1,2-Dichloroethene | 34 | 17.5 | ug/l | 156-59-2 |
| M-47 | 7/15/04 | Manganese | 5,700 | 250 | ug/l | 7439-96-5 |
| M-47 | 7/15/04 | Nickel | 77 | 25 | ug/l | 7440-02-0 |

Table 8. 2004 Groundwater Intervention Limit Data

| Well Name | Date Sampled | Parameter | Result | Intervention Limit | Units | CAS No |
|-----------|--------------|------------------------|--------|--------------------|-------|-----------|
| M-47 | 7/15/04 | Tetrachloroethene | 20 | 1.75 | ug/l | 127-18-4 |
| M-47 | 7/15/04 | Tetrahydrofuran | 34 | 25 | ug/l | 109-99-9 |
| M-47 | 7/15/04 | Trichloroethene | 26 | 7.5 | ug/l | 79-01-6 |
| M-47 | 7/15/04 | Vinyl Chloride | 4.6 | 0.05 | ug/l | 75-01-4 |
| M-47 | 10/27/04 | 1,1-Dichloroethane | 9.3 | 17.5 | ug/l | 75-34-3 |
| M-47 | 10/27/04 | 1,2-Dichloroethane | 1.8 | 1.0 | ug/l | 107-06-2 |
| M-47 | 10/27/04 | 1,2-Dichloropropane | 8.8 | 1.3 | ug/l | 78-87-5 |
| M-47 | 10/27/04 | cis-1,2-Dichloroethene | 28 | 17.5 | ug/l | 156-59-2 |
| M-47 | 10/27/04 | Tetrachloroethene | 14 | 1.75 | ug/l | 127-18-4 |
| M-47 | 10/27/04 | Tetrahydrofuran | 36 | 25 | ug/l | 109-99-9 |
| M-47 | 10/27/04 | Trichloroethene | 20 | 7.5 | ug/l | 79-01-6 |
| M-47 | 10/27/04 | Vinyl Chloride | 3.7 | 0.05 | ug/l | 75-01-4 |
| M-48 | 4/7/04 | 1,1-Dichloroethane | 1.9 | 17.5 | ug/l | 75-34-3 |
| M-48 | 4/7/04 | cis-1,2-Dichloroethene | 5.8 | 17.5 | ug/l | 156-59-2 |
| M-48 | 4/7/04 | Trichloroethene | 1.2 | 7.5 | ug/l | 79-01-6 |
| M-48 | 7/13/04 | 1,1-Dichloroethane | 2.4 | 17.5 | ug/l | 75-34-3 |
| M-48 | 7/13/04 | 1,2-Dichloropropane | 1.2 | 1.3 | ug/l | 78-87-5 |
| M-48 | 7/13/04 | cis-1,2-Dichloroethene | 6.7 | 17.5 | ug/l | 156-59-2 |
| M-48 | 7/13/04 | Manganese | 820 | 250 | ug/l | 7439-96-5 |
| M-48 | 7/13/04 | Tetrachloroethene | 1.2 | 1.75 | ug/l | 127-18-4 |
| M-48 | 7/13/04 | Trichloroethene | 1.4 | 7.5 | ug/l | 79-01-6 |
| M-48 | 10/27/04 | 1,1-Dichloroethane | 2.6 | 17.5 | ug/l | 75-34-3 |
| M-48 | 10/27/04 | cis-1,2-Dichloroethene | 6.6 | 17.5 | ug/l | 156-59-2 |
| M-48 | 10/27/04 | Tetrachloroethene | 1.2 | 1.75 | ug/l | 127-18-4 |
| M-48 | 10/27/04 | Trichloroethene | 1.2 | 7.5 | ug/l | 79-01-6 |
| M-49 | 4/7/04 | 1,1-Dichloroethane | 3.8 | 17.5 | ug/l | 75-34-3 |
| M-49 | 4/7/04 | 1,2-Dichloropropane | 1.5 | 1.3 | ug/l | 78-87-5 |
| M-49 | 4/7/04 | cis-1,2-Dichloroethene | 15 | 17.5 | ug/l | 156-59-2 |
| M-49 | 4/7/04 | Tetrachloroethene | 3.3 | 1.75 | ug/l | 127-18-4 |
| M-49 | 4/7/04 | Vinyl Chloride | 1.1 | 0.05 | ug/l | 75-01-4 |
| M-49 | 7/16/04 | 1,1-Dichloroethane | 5.9 | 17.5 | ug/l | 75-34-3 |
| M-49 | 7/16/04 | 1,2-Dichloropropane | 1.8 | 1.3 | ug/l | 78-87-5 |
| M-49 | 7/16/04 | cis-1,2-Dichloroethene | 22 | 17.5 | ug/l | 156-59-2 |
| M-49 | 7/16/04 | Manganese | 200 | 250 | ug/l | 7439-96-5 |
| M-49 | 7/16/04 | Tetrachloroethene | 2.9 | 1.75 | ug/l | 127-18-4 |
| M-49 | 7/16/04 | Vinyl Chloride | 1.2 | 0.05 | ug/l | 75-01-4 |
| M-49 | 10/25/04 | 1,1-Dichloroethane | 7.1 | 17.5 | ug/l | 75-34-3 |
| M-49 | 10/25/04 | 1,2-Dichloropropane | 1.9 | 1.3 | ug/l | 78-87-5 |
| M-49 | 10/25/04 | cis-1,2-Dichloroethene | 21 | 17.5 | ug/l | 156-59-2 |
| M-49 | 10/25/04 | Tetrachloroethene | 3.7 | 1.75 | ug/l | 127-18-4 |
| M-49 | 10/25/04 | Vinyl Chloride | 1.4 | 0.05 | ug/l | 75-01-4 |
| M-4A | 4/8/04 | 1,1-Dichloroethane | 1.5 | 17.5 | ug/l | 75-34-3 |
| M-4A | 4/8/04 | cis-1,2-Dichloroethene | 2.2 | 17.5 | ug/l | 156-59-2 |
| M-4A | 7/15/04 | 1,1-Dichloroethane | 1.3 | 17.5 | ug/l | 75-34-3 |
| M-4A | 7/15/04 | cis-1,2-Dichloroethene | 3.2 | 17.5 | ug/l | 156-59-2 |
| M-4A | 7/15/04 | Manganese | 99 | 250 | ug/l | 7439-96-5 |
| M-4A | 7/15/04 | Tetrachloroethene | 1.1 | 1.75 | ug/l | 127-18-4 |
| M-4A | 7/15/04 | Zinc | 28 | 500 | ug/l | 7440-66-6 |
| M-4A | 10/28/04 | cis-1,2-Dichloroethene | 1.1 | 17.5 | ug/l | 156-59-2 |
| M-4A | 10/28/04 | Tetrachloroethene | 1.1 | 1.75 | ug/l | 127-18-4 |
| M-5B | 4/6/04 | 1,1-Dichloroethane | 1.8 | 17.5 | ug/l | 75-34-3 |
| M-5B | 4/6/04 | 1,4-Dichlorobenzene | 7.8 | 2.5 | ug/l | 106-46-7 |
| M-5B | 7/15/04 | 1,1-Dichloroethane | 1.5 | 17.5 | ug/l | 75-34-3 |
| M-5B | 7/15/04 | 1,4-Dichlorobenzene | 6.7 | 2.5 | ug/l | 106-46-7 |
| M-5B | 7/15/04 | Arsenic | 27 | 12.5 | ug/l | 7440-38-2 |

Table 8. 2004 Groundwater Intervention Limit Data

| Well Name | Date Sampled | Parameter | Result | Intervention Limit | Units | CAS No |
|-----------|--------------|---------------------|--------|--------------------|-------|-----------|
| M-5B | 7/15/04 | Barium | 870 | 500 | ug/l | 7440-39-3 |
| M-5B | 7/15/04 | Benzene | 1.3 | 2.5 | ug/l | 71-43-2 |
| M-5B | 7/15/04 | Boron | 140 | 150 | ug/l | 7440-42-8 |
| M-5B | 7/15/04 | Manganese | 680 | 250 | ug/l | 7439-96-5 |
| M-5B | 7/15/04 | Nickel | 12 | 25 | ug/l | 7440-02-0 |
| M-5B | 7/15/04 | Toluene | 3.3 | 250 | ug/l | 108-88-3 |
| M-5B | 10/26/04 | 1,1-Dichloroethane | 1.9 | 17.5 | ug/l | 75-34-3 |
| M-5B | 10/26/04 | 1,4-Dichlorobenzene | 5.9 | 2.5 | ug/l | 106-46-7 |
| M-6 | 7/19/04 | Manganese | 370 | 250 | ug/l | 7439-96-5 |
| M-7 | 7/21/04 | Manganese | 260 | 250 | ug/l | 7439-96-5 |

Attachment 7

